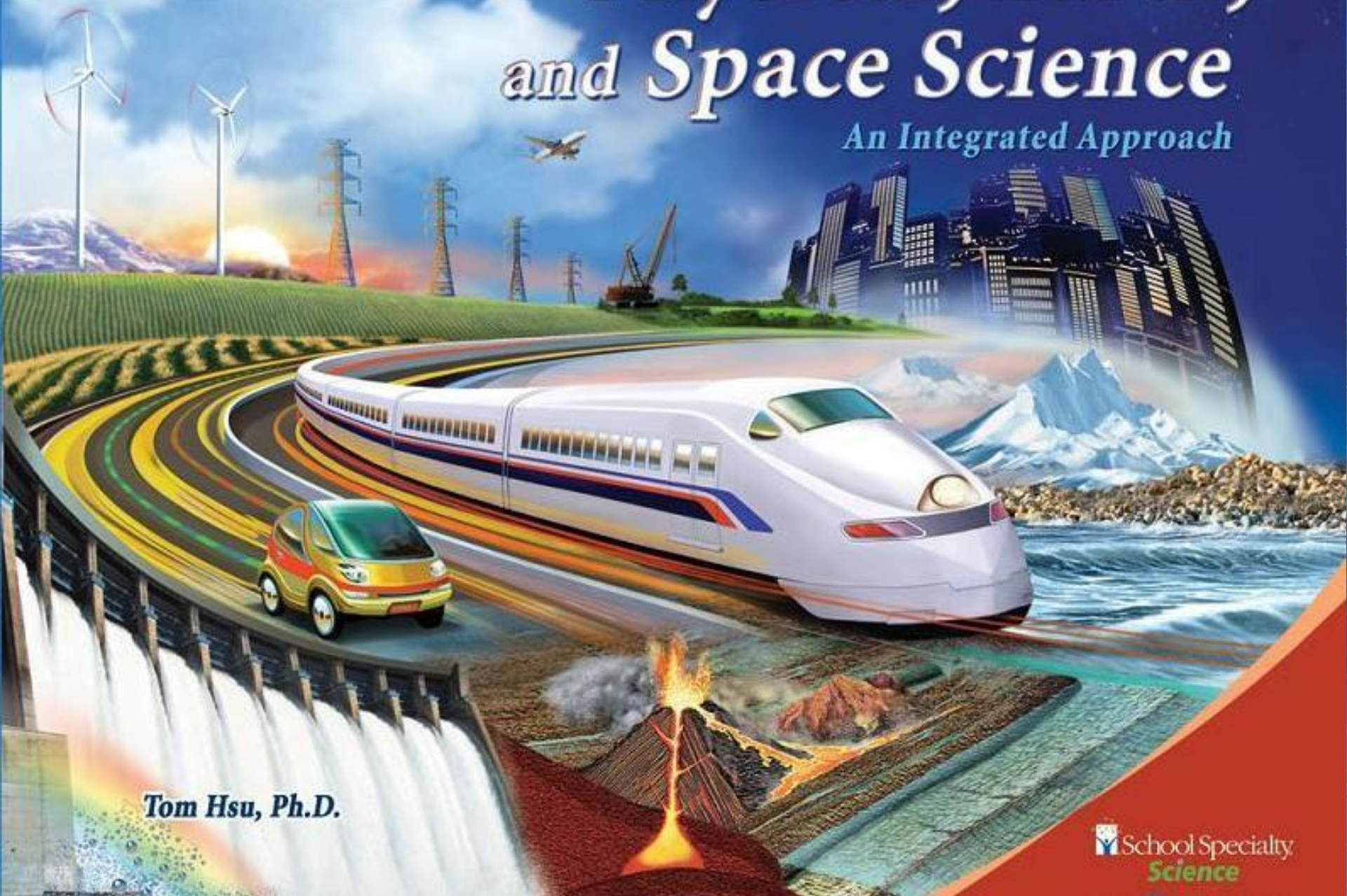


cpo science

Physical, Earth, and Space Science

An Integrated Approach



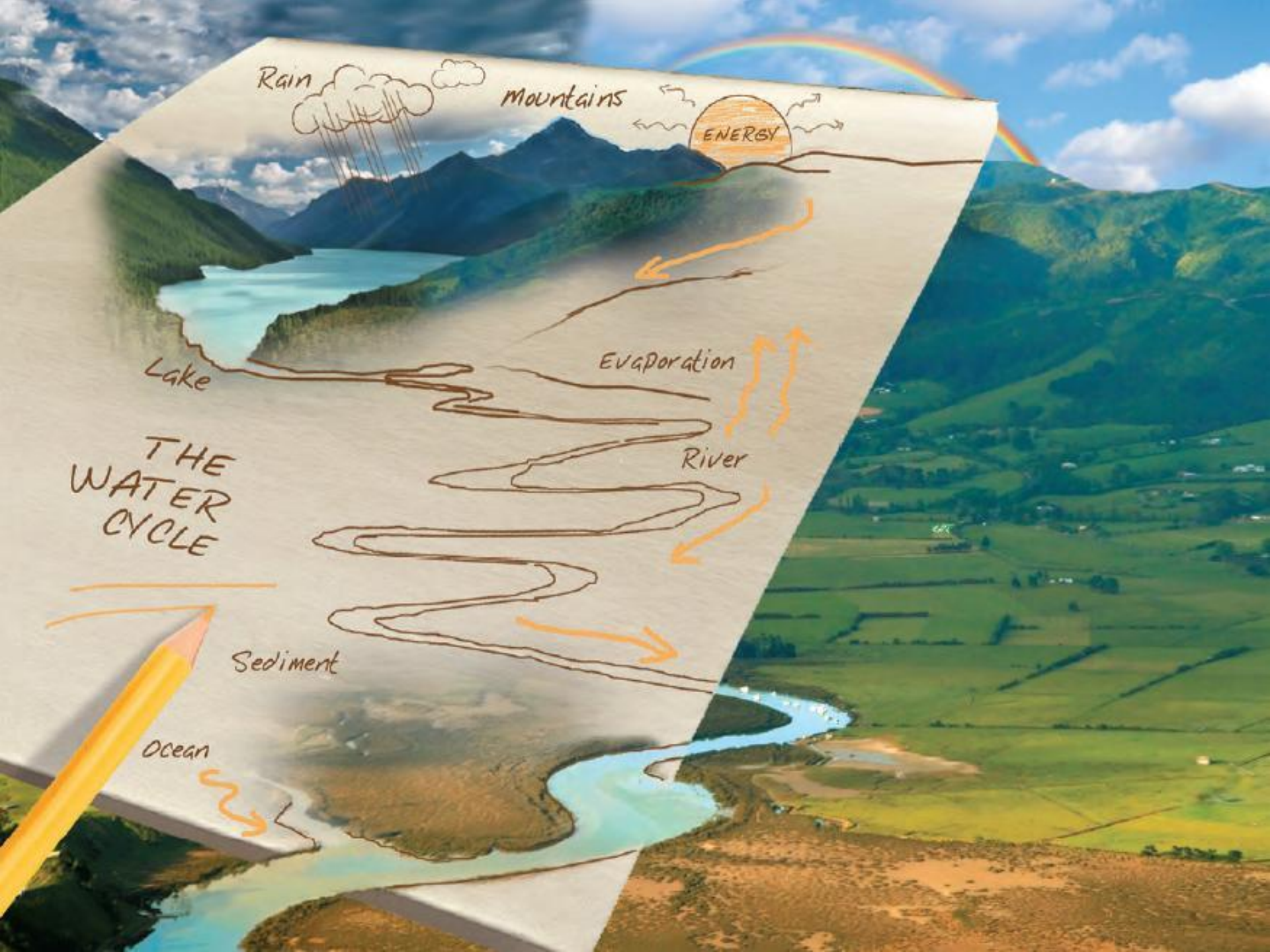
Tom Hsu, Ph.D.

 School Specialty
Science



UNIT SEVEN: Earth's Water

- **Chapter 21 Water and Solutions**
- **Chapter 22 Water Systems**
- **Chapter 23 How Water Shapes the Land**



Rain

Mountains

ENERGY

Lake

Evaporation

River

THE WATER CYCLE

Sediment

Ocean



Chapter Twenty-Three: How Water Shapes the Land

- **23.1 Weathering and Erosion**
- **23.2 Shaping the Land**
- **23.3 Sedimentary Rocks**



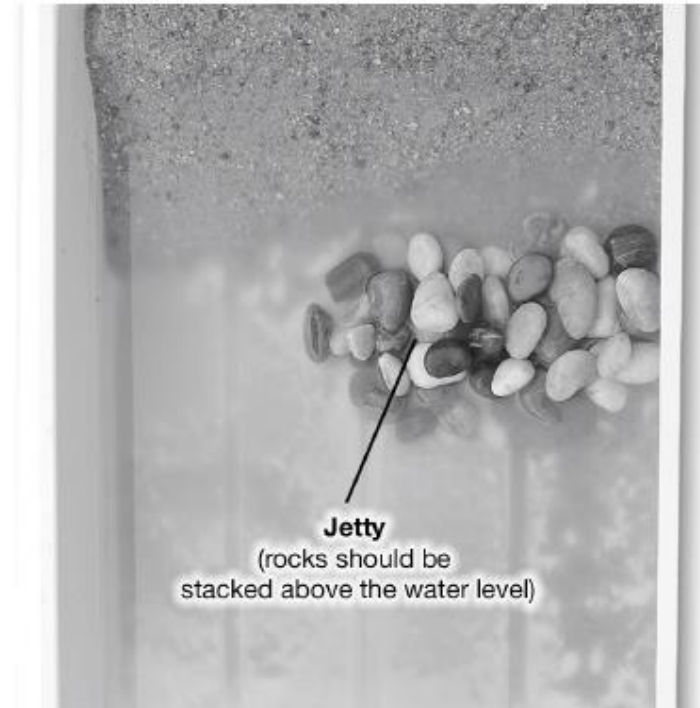
Chapter 23.2 Learning Goals

- **Tell what makes a river and describe its features.**
- **Discuss how rivers and glaciers move sediment.**
- **Use a model to describe how sediment is sorted by water.**

Investigation 23B

Human Impacts on Coastal Erosion

- **Key Question:**
 - *How do people living and working in coastal areas affect erosion?*





23.2 Moving sediment by water

- * Both running water and glaciers alter the land by moving sediment to new locations.

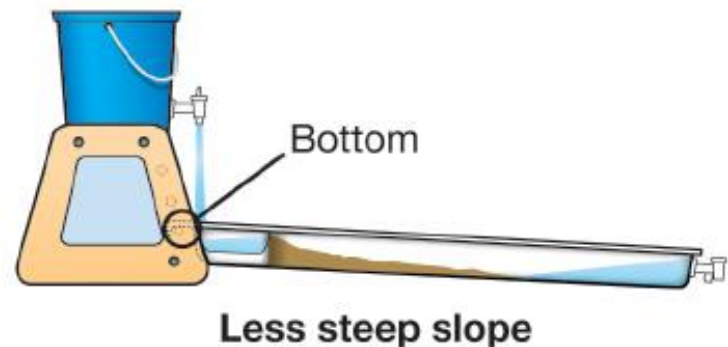
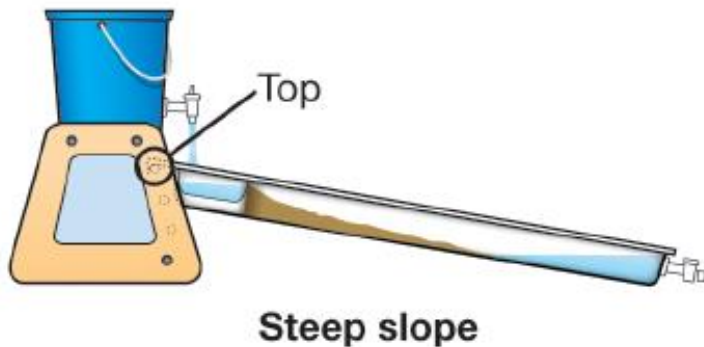
Athabasca Glacier, Canada





23.2 Moving sediment by water

- A stream table can model how water flows over the land.
- The steeper the slope, the faster the water and sediment will move over land.





23.2 Moving sediment by water

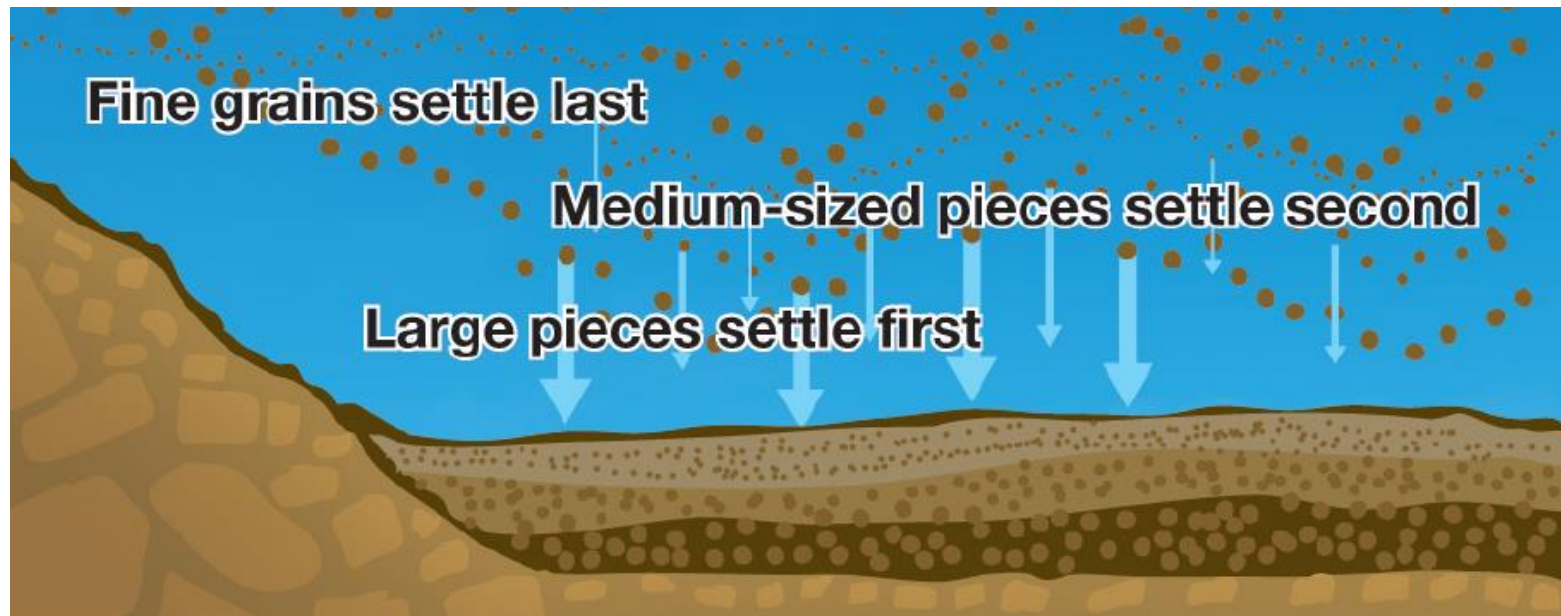
- * The process of depositing sediment after it has been moved by water, wind, ice, or gravity is called *deposition*.



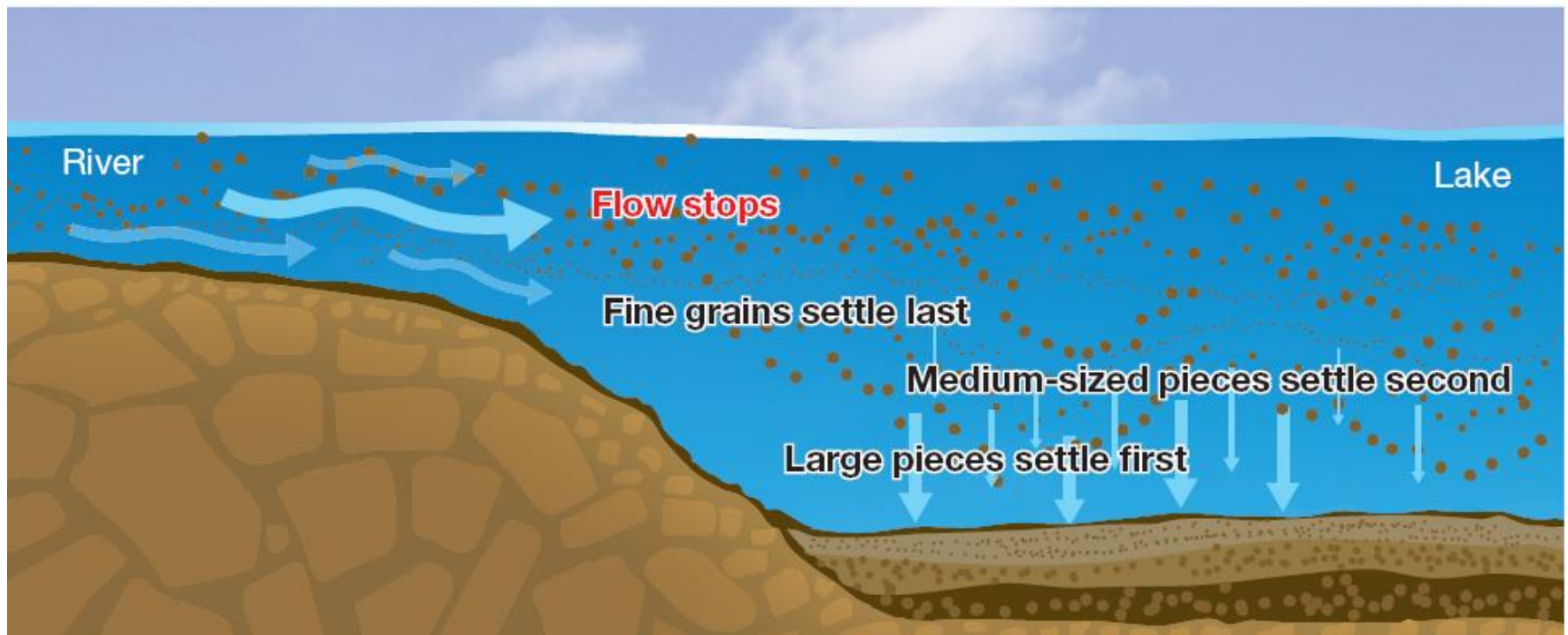


23.2 Moving sediment by water

- * You can tell the speed of flowing water by the size of the rock pieces found on a stream bottom.
- * The grains settle in order, making a pattern called *graded bedding*.

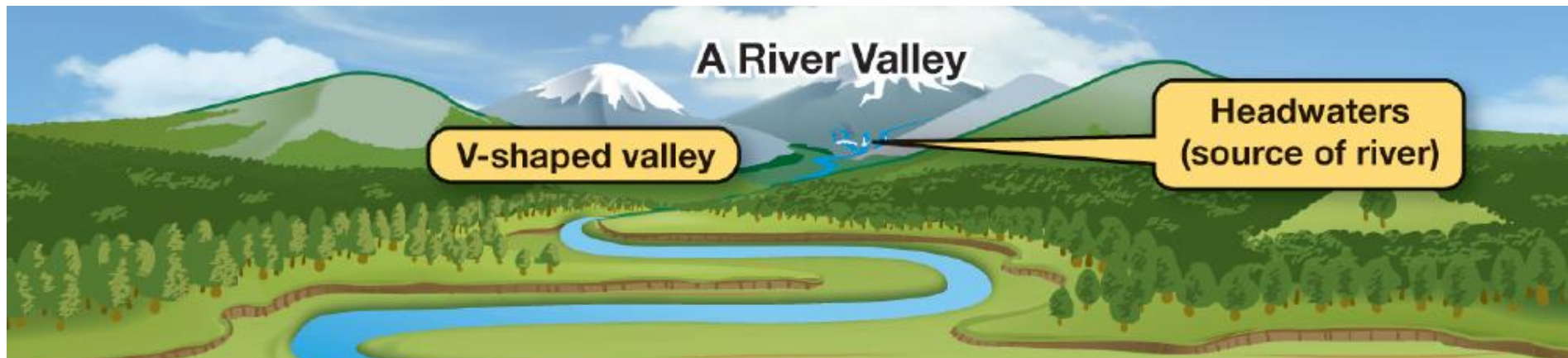


Graded Bedding



23.2 Rivers

- * A *river* is a large, flowing body of water while a *stream* is a small river.
- * The path that a river or stream follows is called a *channel*.



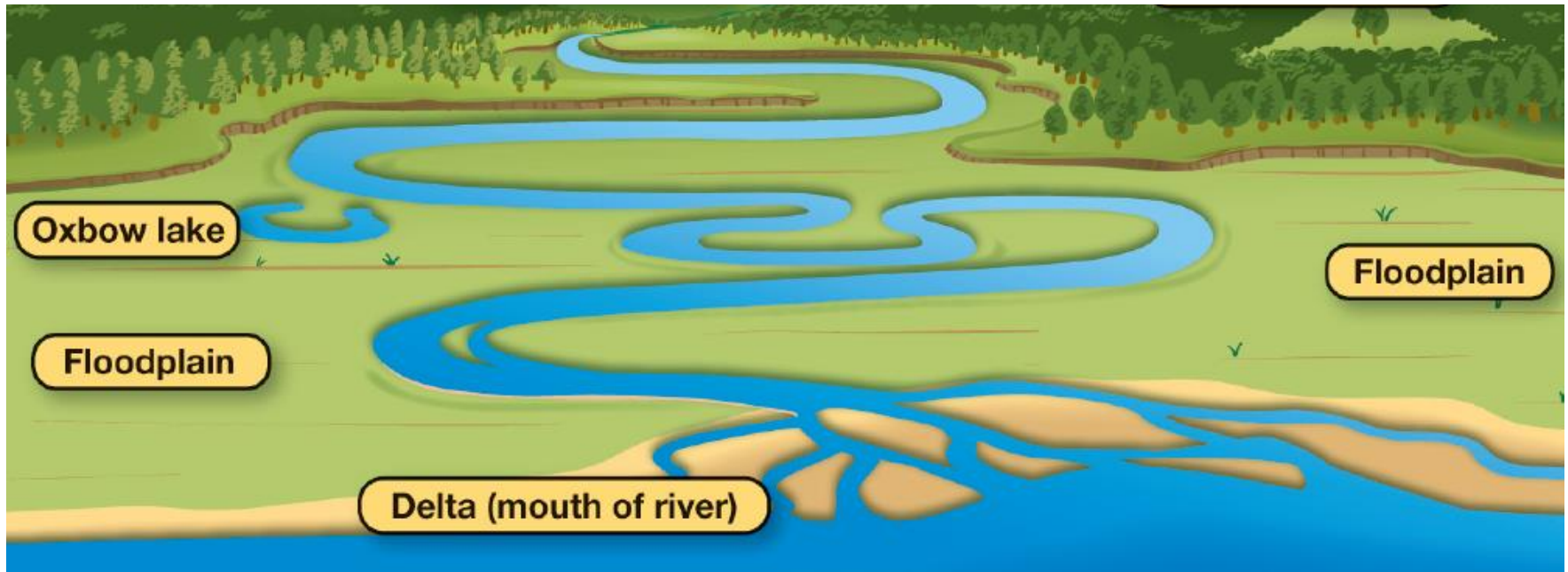
23.2 Rivers

- * Erosion by rivers is an important part of why land looks the way it does at any given time.
- * *Valleys* are low-lying land features that are surrounded by higher land features such as hills and mountains.

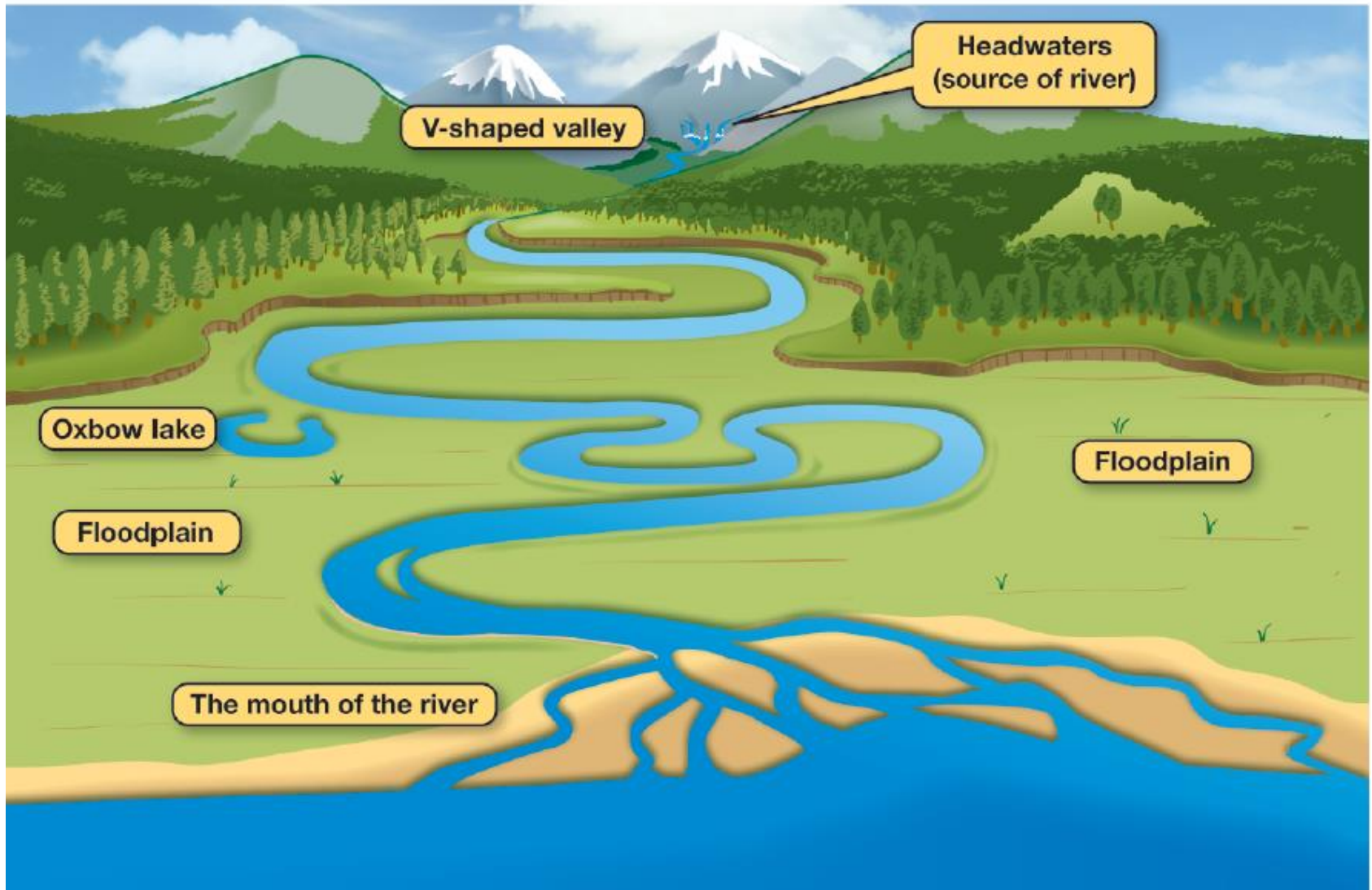


23.2 Rivers

- * A **delta** is the landform associated with the mouth of a river as it flows into an ocean, lake, or another river.
- * A **floodplain** is flat land alongside a river that tends to flood.



A River Valley



23.2 Meanders

- * Some rivers form S-shaped curves called *meanders*.
- * Water flows at different speeds in different parts of the river.

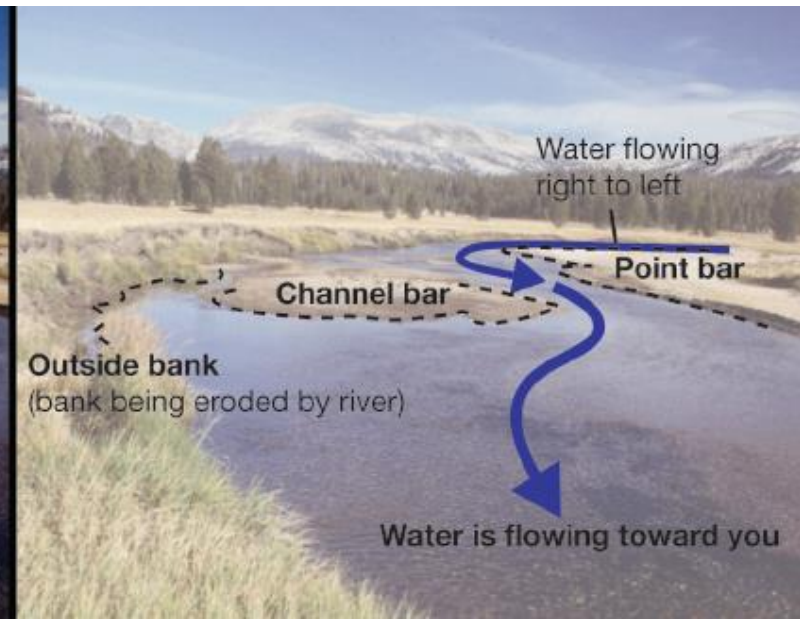
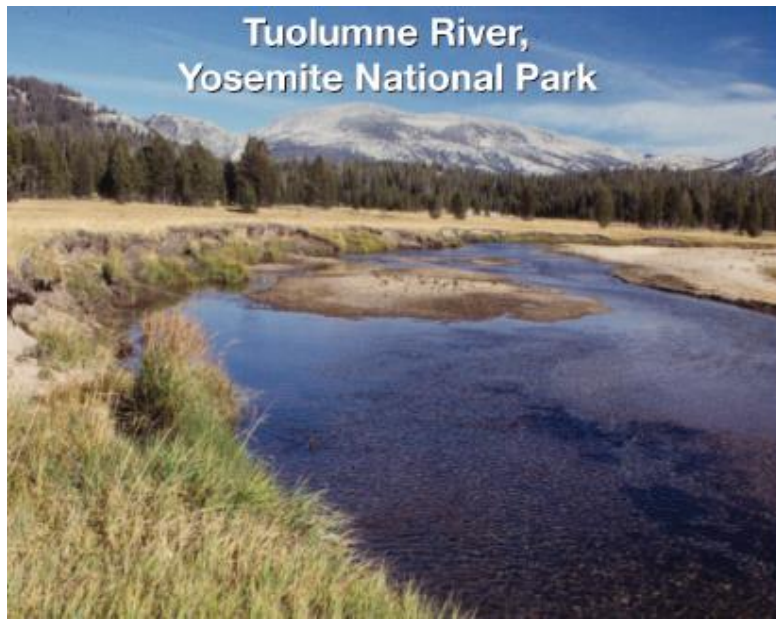
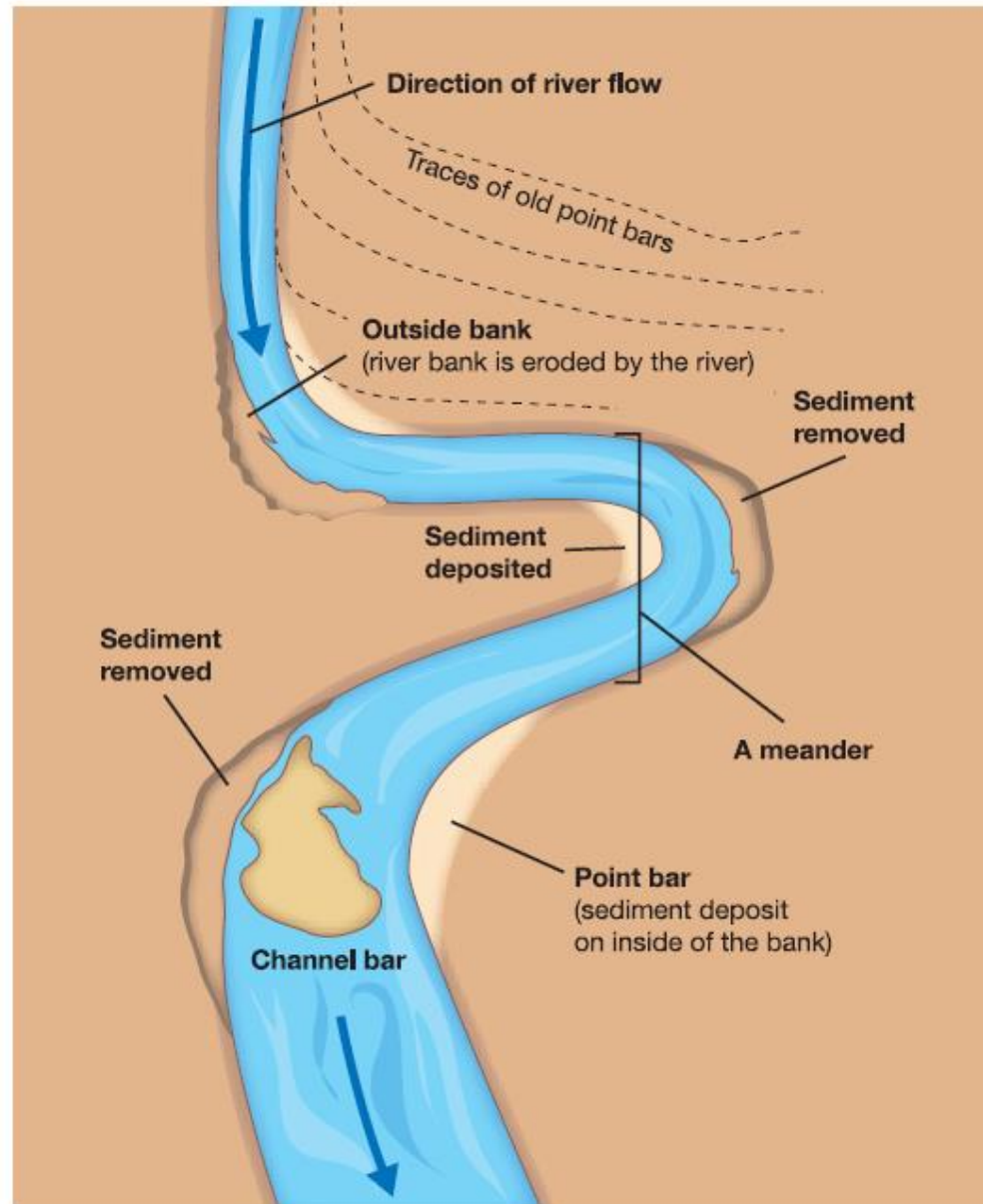


Diagram of a Meandering River



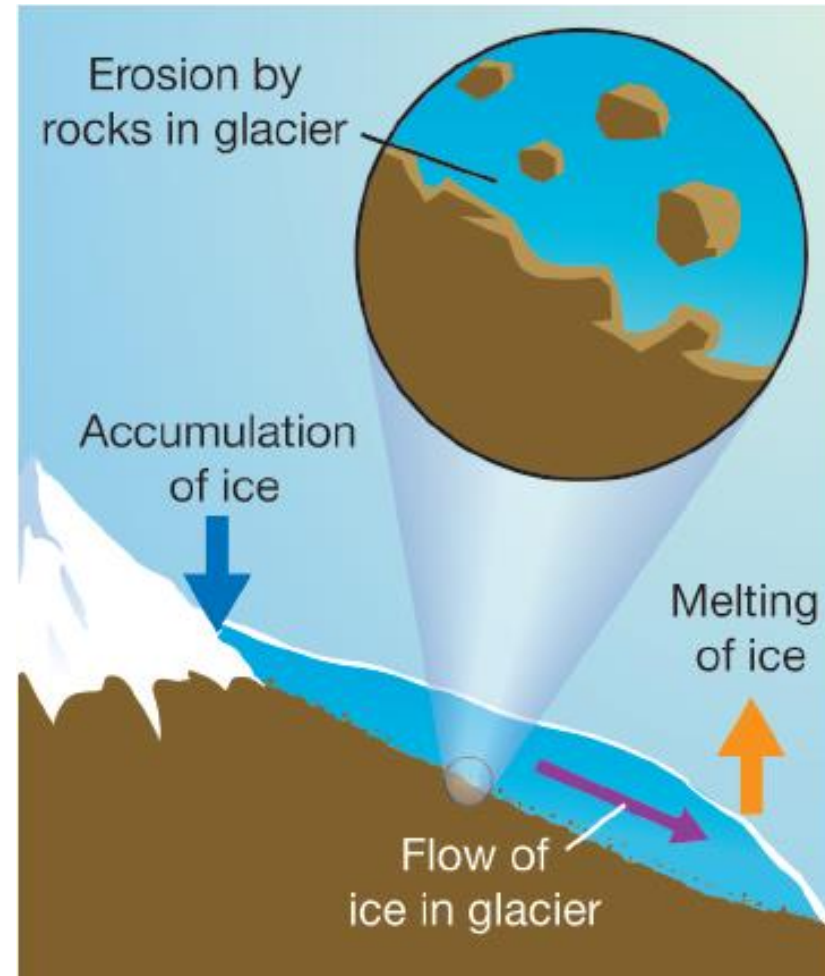
23.2 Meanders

- **A braided stream has many channels that criss-cross each other.**
- **Braided streams get their names from the braided appearance of their many channels.**



23.2 Glaciers move sediment

- * A glacier forms on land when snow and ice accumulate faster than they melt.
- * As layers grow, pressure builds and changes the snow to thick ice.
- * The thick ice becomes so heavy that it becomes plastic and flows.



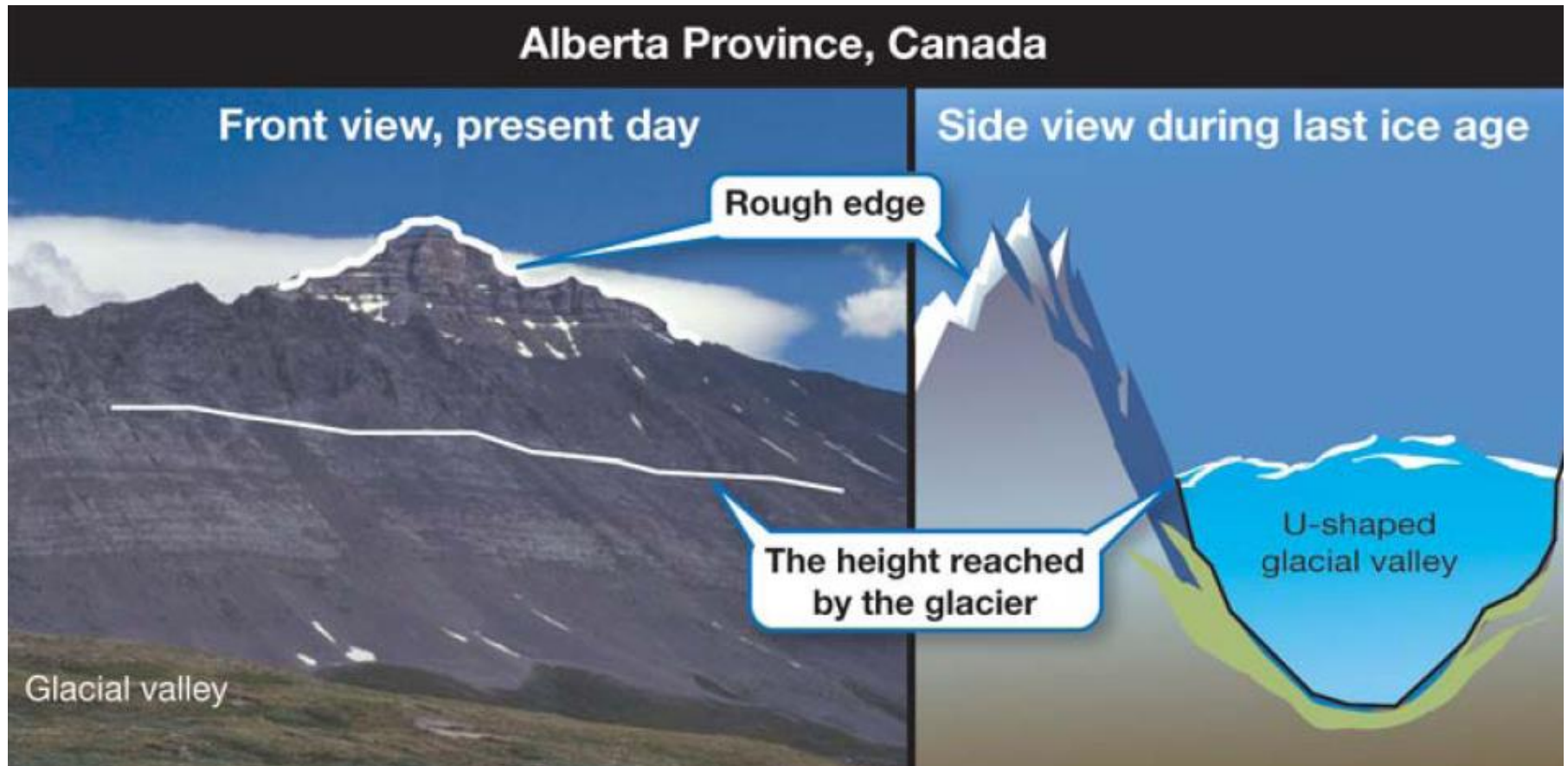
23.2 Glaciers move sediment



- * As the ice of a glacier flows down a valley, it grinds the valley floor with pieces of rock caught up in the ice.
- * This grinding smooths the rock it encounters and changes the shape of the valley so that it is U-shaped.



23.2 Glaciers move sediment





23.2 The effects of ice and glaciers on land and our climate

- **About 30% of Earth's surface was covered by glaciers 10,000 years ago.**
- **Retreating glaciers often leave behind large blocks of ice, surrounded by rock and sediment.**
- **Rocky soil in New England is evidence of glaciers moving and depositing rocks and sediment.**



23.2 The effects of ice and glaciers on land and our climate

- **As the climate warms and glaciers melt, huge piles of rocks scratch surfaces and erode valleys or mountaintops.**





23.2 The effects of ice and glaciers on land and our climate



- * *Permafrost is* permanently frozen soil.
- * The amount of permafrost on Earth is decreasing, another concern of scientists studying climate change.